Light and Lighting

Vol. XLI.—No. 2 February, 1948 Price: One Shilling

Reproduced by courtesy of the Victoria and Albert Museum.

Water under the Bridge

A lot of water has flowed under Waterloo Bridge since Parrott made this drawing in the 1840's, and what would then have seemed idle dreams are now accepted as an everyday part of our lives.

Of all the vast improvements that have been made, none has been more remarkable than electric lighting. From the insufficient, poor quality light of the early days, research scientists in the laboratories of E.L.M.A. Members have developed it until today modern artificial light can well compare with daylight. Added to that, its cost per unit of electricity has been constantly reduced and good lighting is now within the economic reach of everyone.

The Lighting Service Bureau is maintained by the Electric Lamp Manufacturers' Association.

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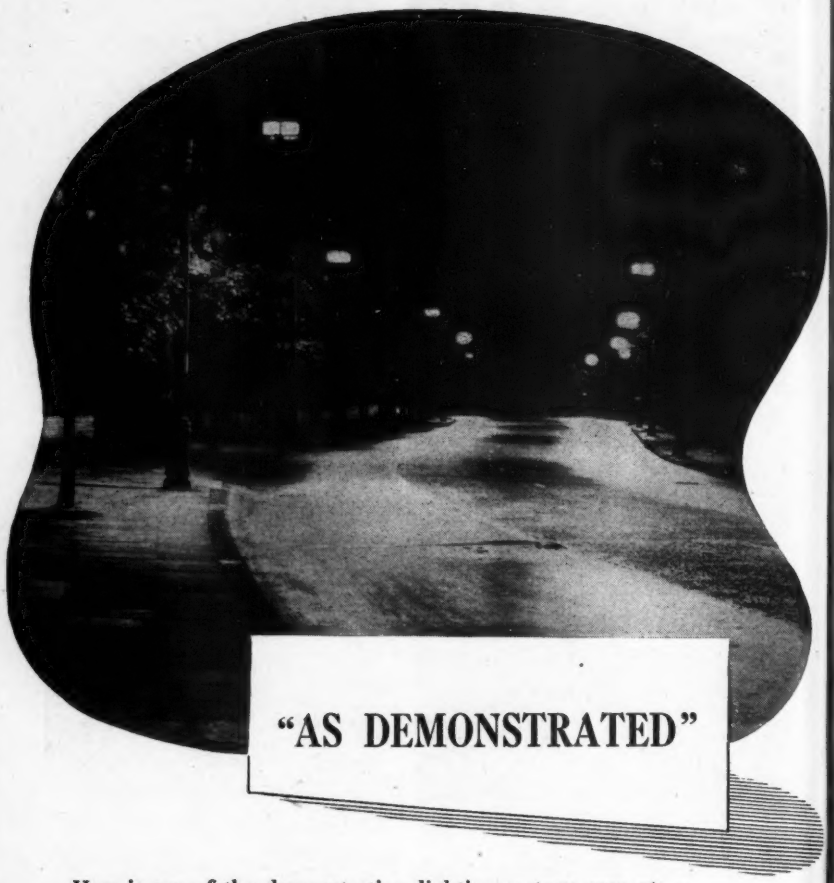
ELECTRIC LAMP MANUFACTURERS' ASSOCIATION OF GREAT BRITAIN LTD

JOURNAL OF SEEING AND ILLUMINATION



"AS DEMONSTRATED"

Here is one of the demonstration lighting systems seen at the Southport conference of Public Lighting Engineers. It makes use of double-unit gas lamps, mounted at a height of 21 ft. 6 inches, and provides Class "A" lighting of considerable power for main traffic routes or shopping centres. Such systems show how existing gas lighting installations can be modernised, with minimum demands on labour and materials, to conform with the recommendations of the Ministry of Transport Committee on Street Lighting.

NOTE: *A handy booklet "Light on the Roads," which summarises and illustrates the main recommendations of the Committee, can be obtained free from the address below.*

BRITISH GAS COUNCIL • 1 GROSVENOR PLACE • LONDON SW1

Light and Lighting

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Lighting and Architecture

THE I.E.S. may be congratulated on securing a paper on the above subject *by an architect* for its joint meeting with the R.I.B.A. on February 10 (see page 31).

Architecture doubtless developed under the influence of natural lighting. Artificial lighting introduces a new element. The trend in architecture itself is changing—rooms are lower—and when night has fallen there are new opportunities. Certainly there is then no object in a slavish imitation of natural lighting conditions by artificial means. Artificial lighting has important utilitarian objects. Some of them can be achieved better than by daylight. But it must also *please*.

These and other questions are discussed in a thoughtful paper by Mr. G. Grenfell Baines. There are many problems. Architects and lighting engineers should get together and solve them.

Illumination Notes and News

Lectures For Young People

On p. 37 will be found a summary of the Model Lecture to School Children which the I.E.S. has prepared. A demonstration of this was recently arranged in Manchester for the benefit of I.E.S. Centres, a number of representatives from which attended and took notes.

Meantime the good work is going on through other agencies. The I.E.S. Bradford Group, which has several times taken enterprising action in this connection, recently arranged for a lecture by Mr. H. A. Ruff to secondary school students at the Technical College. The lecture was embellished by many pleasing experiments with visible and ultra-violet light and proved a great success.

Other lectures have recently been delivered in London; by Mr. J. Paley Yorke, on "The Genie of the Lamp," at the Wandsworth Technical Institute; by Dr. H. A. Thomas and Mr. R. O. Ackerley in the lecture theatre of the Institution of Electrical Engineers; by Dr. W. I. Swinton, Miss M. R. J. Edwards at the Natural History Museum, and finally by Mr. Percy W. Harris for the Royal Photographic Society.

Next I.E.S. Meeting in London

On *March* 9 a paper on *High Voltage Fluorescent Tubes* will be read by Mr. H. G. Jenkins and Mr. J. N. Bowtell at a meeting of the I.E.S. to be held at the Lighting Service Bureau, 2, Savoy Hill, London.

The paper will draw attention to some of the special characteristics of high voltage fluorescent tubes with particular reference to the cold cathode type available in this country at the present time. The various types of cathodes will be discussed and an account given of the luminescent materials in common use.

Mr. R. O. Ackerley in his address on "The Romance of Electric Lighting" traced developments with the aid of many attractive demonstrations, leading up to vapour and fluorescent lighting. The other lecturers covered widely different topics but all were selected for their skill in making evident fascinating aspects of the study of natural science. There is room for much useful effort in this field, and one is glad to see that other bodies besides the I.E.S. are sharing in the good work.

We have spoken above of "young people," and certainly the new generation is of special importance. But there is, of course, also room for lectures to adults—and even for those in high places — demonstrating the wonders of science and what it can achieve for mankind.

During the past year a number of successful lectures have been given at joint meetings of I.E.S. Centres and Groups with other organisations. Centres and groups will shortly be making arrangements for their programmes for the session beginning next October, and no doubt the good work that has been carried out in this direction will be continued.

I.E.S. Newcastle Centre Dinner

The annual dinner of the Newcastle Centre of the I.E.S. was held on January 7. Among those present were Mr. J. S. Preston, vice-president of the I.E.S., Col. G. G. Mallinson, chairman of the North-Eastern Centre of the I.E.E., Col. C. Stephenson, of the North-East Coast Institution of Engineers and Shipbuilders, and the I.E.S. secretary (Mr. G. F. Cole).

In proposing the toast of the Society Colonel Stephenson said that he could think of no more welcome body than a society whose chief aim it was to lighten and brighten the homes and work places of the people. The work of the Society covered an enormous field. He had been particularly pleased to note the lectures which had been given and were being given to the young people in technical colleges and schools, for only by such means would the youth of the country be brought up to value the benefits of correct and proper methods of lighting.

After reviewing the work already carried out by the Society, Colonel Stephenson referred to the archaic lighting conditions which prevail in many rural districts and expressed the hope that the I.E.S. would direct some part of its activities to bringing good lighting to such areas.

In conclusion he referred to the help that had been given by members of the Society to his own firm of shipbuilders during the war, when they had been asked to stage a shipyard lighting demonstration for the purpose of determining the minimum lighting permissible during black-out periods in order to enable workpeople to move about with safety and to carry out essential work. The demonstration had been planned by members of the I.E.S. and was staged by the present chairman of the Newcastle Centre, Mr. C. T. Fielding, and with only a few minor alterations was adopted as the model for all shipyard lighting during the blackout. He was sure that any problems faced by the Society in the future would be dealt with in the same quick and efficient way.

Let the Lights Go Up!

"End the blackout. Light up the streets, brighten the shop-windows, let light conquer gloom. No more dictation from the frosts and fogs of last February."

In these words the *Daily Express* recently urged the need for full restoration of public lighting. Experts have repeatedly declared that the possible fuel saving is minute in comparison with the drawbacks, the increased danger to life and limb, the interference with normal maintenance and regime and the depressing effect on national morale.

An additional reason why street lighting should not be diminished is afforded by the exceptional number of cases of burglaries, theft, and pilfering —a regrettable but not unusual aftermath of a great war. This has been the subject of comment by public lighting engineers and lighting committees on several occasions recently. In Edinburgh, for example, the chief constable has stressed the value of better lighting in discouraging crime, and the streets committee have recommended that lighting should be restored to 75 per cent. of pre-war lighting (as compared with the 50 per cent. sanctioned by the Ministry of Fuel).

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*Electrical Accidents In 1946**

The report of H.M. Senior Electrical Inspector of Factories, Mr. H. W. Swann (which one is glad to note now appears in printed form) contains, as usual, an instructive analysis. One is glad to note some reduction in accidents, especially in connection with portable appliances such as are often adopted for emergency local lighting.

*H.M. Stationery Office; 9d. net.

Forthcoming I.E.S. Meetings

(Provisional List)

MEETINGS AND VISITS IN LONDON

1948.

Mar. 9th. Sessional Meeting. MR. H. G. JENKINS and MR. J. N. BOWTELL on **High Voltage Fluorescent Tubes.** (*At the Lighting Service Bureau, 2, Savoy Hill, London, W.C.2.*) **6 p.m.**

Mar. 23rd. Visit to the Plastics Division of Imperial Chemical Industries, Limited, Welwyn Garden City, **2 p.m.**

April 13th. Sessional Meeting. DR. F. S. HAWKINS, MR. F. V. HAUSER and MR. W. R. STEVENS on **Film Studio Lighting.** (*At the Lighting Service Bureau, 2, Savoy Hill, London, W.C.2.*) **6 p.m.**

MEETINGS OF CENTRES AND GROUPS

1948.

Mar. 1st. MR. W. ALLEN on **Present Trend in Daylight Studies.** (*At the Medical Library, The University, Western Bank, Sheffield.*) **6 p.m.**

Mar. 2nd. MR. W. ALLEN on **Present Trend in Daylight Studies.** (*At the Leeds Corporation Electricity Dept., Whitehall Road, Leeds.*) **6 p.m.**

Mar. 3rd. DR. J. H. NELSON on **Colour and Lighting in Industry.** (*At the Minor Durant Hall, Oxford Street, Newcastle-on-Tyne.*) **6.15 p.m.**

Mar. 5th. MR. G. A. JONES on **Lighting for Photography.** (*At the Gas Dept., Demonstration Theatre, Parliament Street, Nottingham.*) **5.30 p.m.**

Mar. 5th. MR. C. DYKES-BROWN on **Cold Cathode Fluorescent Lighting Installations.** (*At the Electricity Showroom, Market Street, Huddersfield.*) **7 p.m.**

Mar. 8th-11th. Lectures to Newport Schools. (*At the Newport Town Hall Assembly Room.*) **10.30 a.m.** and **2.30 p.m.** daily.

Mar. 9th. MR. F. W. WHITE on **Lighting Problems in a Sugar Refinery.** (*At the Liverpool Corporation Electricity Showrooms, Whitechapel, Liverpool.*) **6 p.m.**

Mar. 11th. MR. J. T. THORNTON on **Television.** (*At the Electricity Dept. Demonstration Theatre, Charles Street, Leicester.*) **6.30 p.m.**

Mar. 11th. MR. T. S. JONES on **Industrial Lighting and Colour.** (*At the Bradford Corporation Electricity Offices, Sunbridge Road, Bradford.*) **7.30 p.m.**

1948.

Mar. 11th. DR. H. H. BALLIN on **The Development of Fluorescent Lighting.** (*At the Lecture Hall, Brighton Municipal Technical College, Brighton.*) **7.30 p.m.**

Mar. 12th. MR. W. J. P. WATSON on **Church Lighting.** (*At the Imperial Hotel, Temple Street, Birmingham.*) **6 p.m.**

Mar. 17th. DR. E. C. WALTON on **Power Factor and the Lighting Engineer.** (*At the Cleveland Scientific and Technical Institution, Corporation Road, Middlesbrough.*) **6.15 p.m.**

Mar. 18th. Annual General Meeting, followed by an **Address** by the President (DR. J. W. T. WALSH) and **Annual Dinner** of the Glasgow Centre.

Mar. 18th. MR. T. S. JONES on **School Lighting.** (*At the Reynolds Hall, College of Technology, Sackville Street, Manchester.*) **6 p.m.**

Mar. 19th. Annual General Meeting of the Edinburgh Centre, followed by an **Address** by the President (DR. J. W. T. WALSH.) (*At the Heriot Watt College, Chambers Street, Edinburgh.*) **6.30 p.m.**

April 2nd. MR. H. G. JENKINS and MR. J. N. BOWTELL on **High Voltage Fluorescent Light Sources.** (*At the Electricity Showrooms, Bath.*) **7 p.m.**

April 5th. Annual General Meeting of the Leeds Centre, followed by an **Address** by the President (DR. J. W. T. WALSH). (*At the Leeds Corporation Electricity Dept., Whitehall Road, Leeds.*) **6 p.m.**

April 6th. MR. G. A. JONES on **Lighting for Photography.** (*At the Liverpool Corporation Electricity Showrooms, Whitechapel, Liverpool.*) **6 p.m.**

April 7th. Annual General Meeting of the Newcastle Centre and **Address** by the President (DR. J. W. T. WALSH). (*At the Minor Durant Hall, Oxford Street, Newcastle-upon-Tyne.*) **6.15 p.m.**

April 8th. MR. J. B. S. SMYTH on **Highways Lighting.** (Special Meeting with Engineers of Local Government Authorities and Supply Companies.) (*At the Cardiff Corporation Demonstration Theatre.*) **3.15 p.m.**

April 8th. MR. C. HURD on **Lighting Maintenance.** (*At the Electricity Dept. Demonstration Theatre, Charles Street, Leicester.*) **6.30 p.m.**

April 8th. MR. T. O. FREETH on **Lighting for Effect.** (*At the Corporation Electricity Offices, Sunbridge Road, Bradford.*) **7.30 p.m.**

(Secretaries of Centres and Groups are requested to send in particulars of any changes in programmes, mentioning subject, author, place, date and time of meeting: summaries of proceedings at meetings (which should not exceed about 250–500 words) and any other local news are also welcome.)

The Lighting of Architecture

Summary of a paper read by Mr. G. Grenfell Baines at the meeting of the Illuminating Engineering Society held in London on February 10th, 1948

In opening this paper the author said that in view of the importance of recent lighting developments the time had now come for a better appreciation of the work of lighting engineers and architects, and in the paper an attempt is made to reveal the architect's attitude to the design of buildings as an indispensable ingredient of visual appreciation.

Light has to be applied both to architecture which was originally designed and used by people who relied on the sun for their main source of light and also to architecture which has been designed to be used at any time of the day or night. Though lighting engineers should not attempt to produce artificial daylight, certain characteristics of sunlight do serve as criteria to be aimed at in a lighting scheme. Sunlight has the advantages of diffusion, which does not tend to destroy surface character, directional lighting, producing shadows on which the successful revelation of architectural form so often depends, and, thirdly, sunlight illuminates without interfering with the spatial quality of a room.

These are characteristics which might well be copied. What should not be carried forward, however, is the imitation window or roof light effect resulting in the creation of panels denying artificial lighting its own expression. During the day the window not only admits daylight, but offers welcome relief to the gaze, and often the concentration, of the occupier. By night, windows do not help in this way and they are covered by curtains to give a warmer sense of enclosure. The creation of artificial windows through which nothing can be seen is usually only introducing a source of irritation.

Referring to the distribution of light by direct and indirect systems, the author said that completely indirect lighting involves no infringement of spatial qualities, but it may give rise to certain construction troubles and is uneconomic. Direct lighting, on the other hand, is responsible for more sins against space than any other unnecessary bric-à-brac. The semi-direct method of fittings fixed to walls or ceilings has produced some of the most successful lighting schemes, having the least deleterious effects on architectural space or surface.

The author dealt at some length with the size, shape, and suitability of lighting fittings and suggested that fittings designers should make a serious endeavour to make fittings as simple and attractive as possible.

Future Possibilities

The introduction of the fluorescent lamp has given rise to a new technique, the architecture of lighting, in which the whole form may be fundamentally affected by considerations of integral lighting and architecture. This technique will not be applicable to every building or room, but there are obviously special buildings used mainly at night, such as places of education or entertainment, in which architecture and lighting may be brought into close relationship.

Though the architecture of lighting is by now a recognised trend, it is not widely established. In such schemes the architect would go to the engineer saying that he wanted certain lighting effects, to obtain which he is prepared to make the necessary modifications of form. It should be the architect's function to give the engineer a clear picture of the lighting effects required and to ask the engineer how they can be achieved. A good lighting scheme must first produce the desired level of illumination, and the architect is concerned by the way in which this is produced and the effects of this on the visual qualities of his work. Full consideration of these matters can only be given by a team, and in this particular problem the team consists of an architect and a lighting engineer.

Whether a building is old or new, whenever lighting engineers are approached to light a building which they consider has architectural character, the author suggests that they should consult an architect as to how the building should be lighted to make the most of the character it possesses. This would bring architects into much closer collaboration, so that whenever they had a building to design in which lighting could play an important part, they would instinctively turn to their lighting engineer for advice.

High Elevation Lighting in Railway Marshalling Yards

It will be recalled that at a meeting of the Illuminating Engineering Society in November, 1946, an experiment with high candle-power lamps suspended from a barrage balloon was described in a paper by Messrs. Cunnington and Golds, and it was then indicated that some more detailed experiments were contemplated.

A further application of the principle of lighting from an exceptional height is now on trial at Hither Green Marshalling Yard, where a 150-ft. temporary tower has been erected carrying the following groups of lighting equipment:

Four 2,000-watt tungsten lamps in vitreous enamel dispersive reflectors.

Eight 1,000-watt tungsten lamps in vitreous enamel R.L.M. reflectors.

Eight 400-watt mercury discharge lamps, horizontally mounted in mirrored reflectors, giving maximum beam at 45 deg.

Eight 650-watt mercury discharge lamps, vertically mounted in dispersive vitreous enamel reflectors.

It has been arranged for any of the above four groups to be operated separately and the intention is to ascertain the effect of various arrangements for distributing the illumination, looked at from the railway operating point of view.

Electrical power for the trial is taken from a diesel-driven generator which, mounted in a rail van, can be easily taken to the site, but for a more permanent installation normal lighting cables would, of course, be used. The range of illumination as measured at ground level shows that the maximum available illuminating power varies from 0.5 to 2.5 foot-candles in the neighbourhood of the tower and reaches up to 0.03 foot-candle at 400 ft. radius. It must, however, be remembered that the demand for illumination will not be uniform all round the tower and that in a permanent installation it will be possible to take advantage of special directive fittings for reaching points considerably

View of the Hither Green sidings from the top of the lighting tower showing how the light is able to penetrate into the gangways between the trucks.

more distant than the 400-ft. radius mentioned above. The main purpose of the trial is to ascertain not only what effective range can be obtained, but also what degree of concentration in certain special directions is possible, in order not to dissipate the available illuminating power in unnecessary areas.

The following are among some of the special features which may be looked for with lighting from an exceptional height:—

(1) The possibility of using modern light sources of exceptional candle-power, run at very high efficiency.
(2) The elimination of many poles, which are an obstruction in the yard and may involve a wide network of cables or overhead wires.
(3) The possibility of reducing the dark shadows normally experienced between adjacent rows of wagons, by virtue of the light beams falling at a much smaller angle from the vertical.

It may also be pointed out that this form of lighting has a markedly different effect from the type of flood-lighting from high masts that has previously been used, because the latter has generally necessitated a more or less horizontal projection of the beams with attendant glare, whereas the exceptional height of the present experiment enables light to be projected in a downward direction, so that shunters working in the yard are not so conscious of the source of the illumination. It is also thought that the lighting of a considerable area with a more uniform average illumination of something like "double moonlight" may have advantages in speeding up work, as compared with the usual light and dark patches arising from the wide diversity of illumination under the usual system of lamp posts.

It is necessary to set off against likely advantages of the system that the initial cost of the towers and equipment will be relatively high, but increased opportunity should arise for using very high candle-power lamps run at greater efficiency than those at present in use, which would be impossible at anything but a high elevation. The running cost in proportion to the illumination provided may thus be relatively small.

It is understood that the general impression on the working staff created by the new system of lighting is favourable and consideration is now being given to the installing of a more permanent scheme with steel masts, with a view to covering the greater portion of the Hither Green Marshalling Yard. Such a scheme would give an opportunity of studying the economics of high elevation lighting in closer detail.

Lighting Artists Must *Light!*

Under this title a contributor to *Tabs*, the journal of the Strand Electric and Engineering Co., Ltd., draws attention to the vital role played by the "lighting artist" in the theatre. It is unfortunate that the extensive vocabulary of the theatre, which deals effectively with the "stage manager," "producer," "property master," "wardrobe mistress," and many other recognised experts with clearly defined functions, contains no adequate descriptive name for the person who devises the lighting.

Yet his work may have much to do with the artistic success of a piece and his art is the only addition to the collective art of drama since the theatre was established by the Greeks.

Ideally the producer of a play should be his own designer, and he should see to it that the lighting arrangements are studied, if necessary, by an independent expert, at an early stage—not, as is often the case, forgotten until the dress rehearsal! Such an expert should be primarily an artist, but he should have available, in the electrician or other assistant, someone conversant with the technicalities of electricity and aware of essential safety precautions.

The C. & G. Silver Medal

The silver medal awarded by the City and Guilds of London Institute as first prize in the Final Examination in Illuminating Engineering held in May, 1947, has been awarded to Mr. J. L. H. Moss. Mr. Moss, who is a member of the I.E.S., has the qualifications F.S.M.C. (Hons.) and F.B.O.A. and is on the staff of the Industrial Health Research Board.

Readers will join with us in congratulating Mr. Moss on receiving this award.

I.E.S. Centre Activities

Birmingham Centre

A successful meeting was held by the Birmingham Centre on January 16, when Mr. C. R. Bicknell presented a paper dealing with applications of flash discharge tubes, a summary of which was given in the January issue of this journal. With the assistance of Mr. G. T. Peck, the author staged a number of effective demonstrations and showed a series of unusual photographs which had been taken using flash tube equipment.

A keen discussion followed the lecture, and one lighting engineer and amateur photographer present in the audience was quick to take advantage of the photographic properties of this type of light source, as is shown by the photograph on this page, which shows Mr. C. J. Allderidge, chairman of the Centre, Mr. C. R. Bicknell, and Mr. W. J. P. Watson, hon. sec. of the Birmingham Centre.

Cardiff Centre

On January 7, Dr. J. W. T. Walsh, president of the I.E.S., visited the Cardiff Centre and gave a talk on the training of the illuminating engineer. The address was very enthusiastically received, and the ensuing discussion, which was opened by Mr. N. D. Houston, provided some very interesting points.

Mr. C. S. Chubb, who has had many years' experience of teaching in the mining industry and who is now engaged on educational work with the National Coal Board, said that in areas where the Society was unable to prevail upon the local education authority to provide a course in illuminating engineering would-be students might well be advised to take a course in the basic sciences, mathematics, physics, and chemistry. He said that it had been shown in mining engineering that a student who became proficient in such subjects was quite capable of becoming a qualified mining engineer, and he thought that the same reasoning might equally well apply to those wishing to qualify as lighting engineers. Dr. Walsh agreed that the idea was worthy of consideration, and should appeal to those who were unable to attend a regular course in illuminating engineering.

A further item of interest at this meeting was the presentation by the Centre chairman, Mr. J. Trevor Jones, of a hide travelling case to Mr. S. G. Turner as a tribute from the members of the Centre in recognition of the many years of valuable service which he had given to the Centre as honorary secretary. Dr. Walsh also referred to the work of Mr. Turner, and mentioned the obstacles he had overcome in the early stages of the Centre, when Mr. Turner had been one of the founder members. In reply, Mr. Turner, who is now vice-chairman of the Centre, said that he hoped to be able to serve the Centre and the Society for many years to come.

Photograph taken by Mr. F. E. Chapman at the meeting of the Birmingham I.E.S. Centre, January 16th.

Leeds Centre

The meeting of the Leeds Centre, on January 12, took the form of a discussion on Textile Lighting, which was opened by Mr. T. C. Holdsworth and Mr. E. Smith.

Mr. Smith opened the discussion by referring to the fundamentals of lighting and their application to the satisfactory solution of lighting problems in the textile industry. He stressed the importance of adequate light, and referred to the importance of colour in providing contrast and to the spectral emission of different light sources.

Mr. Holdsworth dealt with the more practical side of the solution of textile lighting problems, and in particular with the lighting of Jacquard looms and tentering looms. Reference was also made to the relative economics of tungsten and fluorescent lighting, and it was pointed out that in spite of the higher capital costs of fluorescent lighting there was a saving to the user if the number of lighting hours was sufficiently high.

The ensuing discussion was opened by Mr. J. Bateman, and a number of members of the Association of Supervising Electrical Engineers, who were present by invitation, also took part. Speakers amongst the local I.E.S. members were Mr. H. B. Mellor, Mr. J. W. Howell, and Mr. M. W. Hime.

Cold Cathode Lighting in Australia

By H. A. PURDIE, F.I.E.S.

A description of recent lighting installations for Trans-Australia Airlines of Melbourne.

In the early days of fluorescent lighting general opinion had it that good results could not be expected from this form of lighting where great mounting heights were involved. During 1947, however, several large installations where mounting heights ranged up to 25 ft., and initial illumination values reached 40 ft.c. have been completed in textile mills in Australia.

The recently completed cold cathode fluorescent installation in the Igloo hangar of Trans-Australia Airlines at Essendon Airport near Melbourne, has a maximum mounting height of 30 ft., and is the largest and most spectacular example in Australia, and possibly in the world. This installation was expressly designed by the author in co-operation with Mr. A. G. Ellis, architect, of the office of Harry A. Norris, Melbourne, to produce some 30 ft.c. continuously in service up to and just over plane wing level, after allowing for depreciation due to dusty conditions and a probable 24-hour per day operating period.

Initial illumination values in the empty hangar were approximately 55 ft.c. horizontally at all levels from the floor up to 18 ft., with an expected slight fall at the ends of the runs of equipment. With a "Skymaster" plane in position for servicing, 50 ft.c. was recorded just inside the astral dome at the rear of the cockpit, 55 ft.c. on wingtips, 30 ft.c. inside the nacelles immediately behind the engines, 7-10 ft.c. at floor level between wings and main body, and 5 ft.c. inside retractable wheel compartments. Vertical illumination around the machine averaged 60 per cent. of horizontal values.

Wall and ceiling surfaces are of aluminium paint finish, whilst the cement flooring reflects about 26 per cent. of the light it receives and is thus instrumental in illuminating underside wing surfaces. Under-wing examination for faulty rivets is completed in one-quarter of the time it previously took, with the aid of a torch, in a neighbouring hangar equipped with an incandescent installation producing about 15 ft.c.

The installation consists of 10 continuous lines of porcelain enamelled steel reflectors spaced in 13 ft. centres each carrying six lines of standard 93 in. cold cathode lamps. These are operated in series in sets of six powered for an 80 ma. operating current by transformers arranged in pairs at 16 ft. intervals along each continuous line of

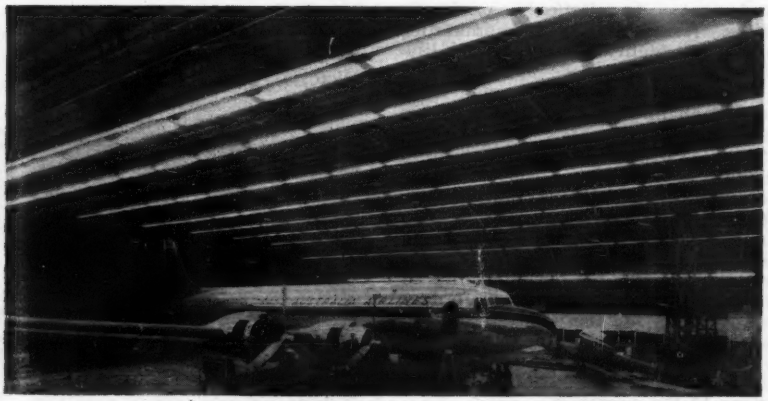


Fig. 1. View of interior of hangar.

Fig. 2. View of hangar from the outside.

112 ft. overall. The central six lines are mounted at 30 ft. above floor level. whilst the outer two lines are at 23 and 26 ft., and set at angles of 5 degrees and 15 degrees approximately, from the horizontal. Clear floor space at present measures 130 ft. by 130 ft., and an extension of 12 ft. in length has still to be made and lighted when the open-end is fitted with doors.

The total loading of the lighting installation inclusive of all auxiliary losses is 49 kw. or about one-third of that which would be required for an incandescent installation producing similar results in both illumination value and quality. Loading and illumination value connote approximately 3 watts per square foot of main floor area, or an initial 18 ft.c. per watt per square foot.

Trans-Australia Airlines also set a standard of comfort and convenience in their new head office and terminal in Melbourne. Comfortable seating, air conditioning, writing facilities, and all the other conveniences await the traveller there to make his initiation into air travel a pleasure instead of an ordeal. The lighting of these premises was planned to provide efficient illumination, to lend both dignity and glamour to the interior, and to present an attractive picture to the passer-by.

The result, as shown by the photograph, is an impression of restrained opulence and warm spaciousness, the illumination being sufficient for the efficient handling of the thousands of travellers who pass through the terminal.

Owing to the height of the ceiling, relative to street level, of the main booking hall, a special shallow, continuous line fluorescent fitting was designed and employed. In order to provide adequate vertical illumination on maps and indicators mounted on the walls, the fittings nearest to the walls have one side open.

The photographs published above are by courtesy of Claude Neon Lights (Victoria), Ltd., of Australia.

Fig. 3. Main booking hall.

Lecture to School Children

Summary of the standard I.E.S. lecture to school children which was demonstrated to members at Manchester on January 30th.

A number of very successful lectures to school children have been given in the past by Centres and Groups of the I.E.S. The results of these have been the increasing popularity of the lectures in places where they have already been given and numerous requests for similar lectures to be given in other localities. The standard form of lecture, the presentation of which takes about 45 minutes, is summarised below.

Light Sources

The lecture opens with a brief review of the history of light sources, and a series of lantern slides shows the development of oil lamps from the earliest known type (of about 8000 B.C.) up to the introduction of gas lighting.

In the search for better light it was noticed that certain materials became bright if they were made very hot. The earlier gas jets were not very satisfactory in this connection, but the introduction of the bunsen burner led to the development of the gas mantle, the manufacture of which is briefly described in the lecture.

While these developments were being carried out, experiments were also being made in attempts to get light from electricity, and the first electric light source was the carbon arc. Though carbon arcs still find important uses to-day (e.g., in searchlights and cinematograph projectors), they are unsuitable for ordinary use. The first filament lamps were introduced in 1878, the filament being a fine thread of carbon, which emitted light when heated by the passage of an electric current, the filament being enclosed in an evacuated glass bulb to prevent the rapid disintegration of the filament. Thirty years later the carbon filament was replaced by one made of fine tungsten wire, which was more durable. The original filaments were straight wires, but now they are in the form of a coil, the advantages of which are demonstrated by passing a current through a length of wire, part of which is straight and part coiled.

The next development in electric lighting was the advent of the vapour discharge lamp, and both the mercury and the sodium lamps are described and demonstrated in the lecture. These lamps have the advantage of higher efficiency, but their colour-rendering properties, which are demonstrated, are poor. Apart from emitting a blue light, the mercury lamp also emits a good deal of ultra-violet radiation. There are special tubes of mercury discharge lamps known as black glass lamps, which emit only the ultra-violet radiation. Such a lamp is demonstrated, and the audience is usually very amused when the lamp is directed on to them to find that their teeth and fingernails fluoresce brilliantly. Other experiments with black light and fluorescent materials are made.

This phenomena is made use of in the fluorescent lamp, which for the same energy gives three times as much light as a filament lamp. This type of lamp is demonstrated in the form of a tube, of which only half is coated with fluorescent powder so that only that part of the tube gives light, the remaining part giving only a pale blue glow. By using different powders lamp manufacturers can control the colour of the light produced by these lamps.

The Eye and Vision

The second half of the lecture deals with vision, how the eye makes use of the light which is provided. The analogy between the eye and the camera is explained, and experiments are carried out to show that the eye can see much more quickly with good illumination than with poor illumination. One of the demonstrations shows how higher levels of lighting enable one to see moving objects more easily.

The adverse effect of bright lights within the field of vision is shown by placing the lamp near a card printed with varying sizes of letters so that it becomes difficult or impossible to read the small lettering. This is because the bright light causes the iris of the eye to get smaller and also makes the retina less sensitive. Light used in such a way is both uncomfortable and dangerous and is said to cause "glare." Glare can also be caused by reflections on shiny surfaces, which can be equally disturbing.

The direction from which light comes and the way in which it reaches the object at which we are looking is also important. Objects which look smooth under light coming from one direction may look quite rough when seen under light from another direction, as is demonstrated.

The Lighting of Churches

(Communicated.)

Advice on the lighting of churches is contained in the tenth report of the Central Council for the Care of Churches published in December last.

Mr. Forsyth, F.R.I.B.A., writing on this subject, strongly advises that churches should do away with flood-lighting. "What is a source of beauty by day cannot be imitated electrically by night." The objection to flood-lighting is that it kills shadow. "No shadows, no form."

In the discussion, however, one speaker suggested that by using tilted shades shadows could be secured; flood-lighting, "if carefully laid, does give an extraordinarily lovely effect."

The report states that the artificial illumination of churches frequently falls into the error of introducing full lighting when but a limited amount is required for general use. The principal aim should be to light the books of the congregation rather than mainly to illuminate the interior. Lights screened, or from hidden sources, are necessary on the pulpit, the lectern, and the organ.

Reference is made in the report to the beautiful eighteenth-century candelabra possessed by many churches. These often have several tiers of lamps, but are usually centrally placed. These are much enhanced in interest by a restrained edition of small lamps of a candle type. Mr. Forsyth deprecates electricity being brought into churches by overhead cable, for the swing of the cable may weaken a vital buttress.

The conclusion is that, in general, in English churches no attempt should be made to place the main sources of light in hidden positions. Lamps and fittings, if displayed, will serve materially to indicate the scale and extent of the church. Additional lights are required in the porches, the organ, the crypt, tower, belfry, and heating chamber. Finally, all wiring should be protected from injury or misuse by being laid in screwed metal tubing.

B. S. T.

Lighting in Coal Mines

In recent issues of the journal (September and October, 1947) reference was made to the work now being carried out by a special committee of the National Coal Board in connection with the improvement of lighting in coal mines. A special fitting for road lighting in mines has been produced by the British Thomson-Houston Company, and is in use at a number of collieries. This fitting is of a cast aluminium alloy and is made

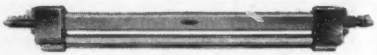


Fig. 1.

either for single or double cable entry. The lamp is enclosed in a clear glass or "Perspex" cylinder, and all the necessary auxiliary gear is assembled and wired within the fitting. Although tests have shown that in this application fluorescent lamps are inherently safer than tungsten lamps, as a safety precaution two safety switches are incorporated in the circuit of the fitting, so that if the lamp is fractured the switches open and isolate the fitting from the mains supply. The fitting is shown in Fig. 1.

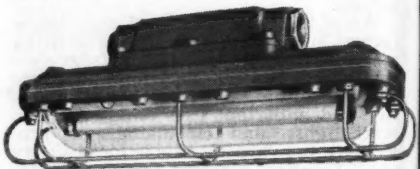


Fig. 2.

Tests are also being made on lighting at the coal-face, and Fig. 2 shows a fitting made by the General Electric Company which has been installed at the Chislet Colliery. This fitting incorporates a 15-watt fluorescent lamp. The coal seam at Chislet varies in thickness between 3 ft. and 5 ft. 9 in., and the fittings, which are experimentally coupled in pairs by flameproof couplers, are suspended directly over the conveyor at intervals of approximately five yards.

Light and Vision: The Wisdom of the Ages

2.—The Wonder of Vision

To most people, seeing is such a natural and commonplace act that they never reflect upon the marvel of it, nor realise explicitly that, so far as sight is concerned, the "stuff" of all "objects" is intangible—is simply light. Many philosophers have reminded us of this truth, including George Berkeley (1685-1753), from whose "Essay Towards a New Theory of Vision" (1709) the following quotations are taken.

"Upon the whole, it seems that if we consider the use and end of sight, together with the present state and circumstances of our being, we shall not find any great cause to complain of any defect or imperfection in it, or easily conceive how it could be mended, with such admirable wisdom is that faculty contrived, both for the pleasure and convenience of life . . . but there is no other *immediate* object of sight besides light and colours. All that is properly perceived by the visive faculty amounts to no more than colours with their variations, and different proportions of light and shade; but . . . I thing we may fairly conclude that the proper objects of vision constitute a universal language of the author of nature, whereby we are instructed how to regulate our actions in order to attain those things that are necessary to the preservation and well-being of our bodies, as also to avoid whatever may be hurtful and destructive of them. It is by their information that we are principally guided in all the transactions and concerns of life. . . . Suppose one who had always continued blind be told by his guide that after he has advanced so many steps he shall come to the brink of a precipice or be stopped by a wall, must not this to him seem very admirable and surprising? He cannot conceive how it is possible for mortals to frame such predictions as these, which, to him, would seem as strange and unaccountable as prophecy doth to others. Even they who are blessed with the visive faculty may (though familiarity make it less observed) find therein sufficient cause of admiration. The wonderful art and contrivance wherewith it is adjusted to those ends and purposes for which it was apparently designed, the vast extent, number, and variety of objects that are at once with so much ease, and quickness, and pleasure suggested by it; all these afford subject for much and pleasing speculation, and may, if anything, give us some glimmering, analogous prenotion of things which are placed beyond the certain discovery and comprehension of our present state."

3.—Light and Vivacity

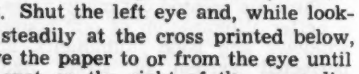
It is not only those who have a professional interest in light who stress its supreme importance to us. In her treatise on Sleep, published in the 'nineties, Marie de Manacéine (St. Petersburg) writes as follows:—

"The importance of light for the conscious intellectual life is so great that, as Purkinje pointed out many years ago, a better illumination of our houses by windows and good illuminants, and a perfected system of street lighting, should distinctly favour the growth of social life. Light not only drives away sleepiness but increases the general activity and enlarges the sum-total of consciousness. In the extreme north, with its endless night, psychic life attains a very low degree of development; and a distinguished observer (Johannes Müller) has remarked that in darkness we can never be so witty and intelligent as in the light. This is evident when we remember that darkness, especially when combined with silence, deprives us of our habitual sensations due to stimuli from the external world. . . . Light plays so important a part in mental life that consciousness on awaking from its periods of repose should be able to expand in its brightness. . . . We owe everything to light; without it life is impossible; it is light that we are searching for all our lives everywhere and in everything, and it is natural that we should so act as to awaken every day in the midst of light and not of darkness."

A Curiosity of Normal Sight

Many of our readers are doubtless aware that all human eyes are blind over the area occupied by the head of the optic nerve. In the ordinary way, we do not notice this local blindness, and are quite unconscious of any hole or gap in the scenes we survey. There are several reasons for this, and one of them is that the blind spot is situated outside the only part of the retina that is designed for nice discrimination. With the latter we scan the scene before us, taking in the details of it successively and so building up a complete mental picture of it. In this process of scanning, any part of the external scene which is imagined on the blind spot at one instant is necessarily imagined on a sensitive spot at another instant, and our "impression" of the whole scene is based upon a number of "superimposed" snapshots of it.

It is quite easy, however, to satisfy ourselves of the presence of the blind spot. Shut the left eye and, while looking steadily at the cross printed below, move the paper to or from the eye until the spot on the right of the cross disappears from view. This it will do when the paper is so positioned that the image of the spot falls on the head of the optic nerve.



The blind spot is large enough to put out of sight the face of a person who is only six or seven feet away from us, and this is sometimes a perfectly valid excuse for our failure to recognise a friend whom we pass in the street. Sometimes it also accounts for our painful collision with an obstacle!

There are other, but smaller, blind spots in our eyes, of which we are generally unaware, and which are of no practical consequence. They are physiologically blind and, therefore, are not abnormalities. But blind areas sometimes occur as the result of injury or disease of the eyes; their presence may be very disconcerting, and special caution may be required to avoid sustaining accidents.

A New Name For An Old Unit

Since the I.E.S. abandoned the expression "foot-candles" in favour of "lumens per square foot," more than one suggestion has been put forward for a verbal abbreviation of this rather cumbrous expression. For convenience in writing, shorthand versions are easy to find, as, L/sq.ft., L/ft.^{2}, lm/ft.^{2} and l.s.f., but only the last of these can be verbalised. No doubt there is something to be said in favour of l.s.f., but there are also objections to it. Do we really want to add to the rapidly growing number of initial-letter-abbreviations of technical terms, organisations, and so forth, which is making mumbo-jumbo of our speech? We have £.s.d., B.Th.U., E.L.M.A., B.U., and so on, almost *ad infinitum*. Moreover, as a spoken word, l.s.f. is trisyllabic (we should hate to write it as an actual word—"ellesseff!"), so it saves us only two syllables when we say it instead of "lumens per square foot."

Now for the Continental unit of illumination, the lumen per square metre, there is a simple, monosyllabic word with which we have long been familiar, it is "lux." It seems to the writer that the British unit can be given a name which has the merit of similar brevity while, at the same time, indicating in what way our own unit differs from the Continental one. "Lux," of course, is the Latin word for "light," and "lumen" is derived from it. So we may regard the "lu" in "lux" as an abbreviation of "lumen," and the final letter "x" as a symbol denoting the unit area used in the Continental, or metric, system. All we need, then, is to choose a letter symbolising the British unit area and add it to the root "lu," thus forming a monosyllabic word for our own unit of illumination on a rational basis. The obvious choice of letter is "f," so that we get the word "luf" which, like "lux," needs no plural. This is not a particularly euphonious word, but its simplicity and rationality commend it, and, if it be objected that it is not self-descriptive, it should be remembered that this is also true of "lux," as well as of other terms in the vocabulary of lighting.

Lighting of Large Retail Stores

(Part II.)

By A. W. JERVIS

The second in this series of three articles dealing with problems associated with retail stores, the first of which appeared in the January issue.

The lighting of a store affects a greater percentage of the population than any other lighting application; whereas a factory is only concerned with its own workers or a domestic installation with its own small family circle, the store will cover a population of a whole town, or maybe a county, or, with some of the larger London stores, an even wider field.

Its potential influence on our everyday life is therefore widespread, and in these days of rationing and restrictions well-lit premises can help to soothe the nerves of harassed shoppers.

"People buy where the light is right" used to be a sales slogan, but it is nevertheless true, and many a sales transaction has been deferred because the customer could not inspect the merchandise properly. Advertising can bring the people to a store but it cannot make them buy, and the growth of large stores during the last thirty years is an indication of that same value. The range of merchandise sold will vary with different types and grades of stores, and with it the variety of problems associated with lighting.

Apart from showroom areas, the lighting schemes must cater for workrooms, passages, restaurants, cafeterias, offices, and kitchens, all of which need their own individual treatment and must be correlated in the general scheme. For example, the level of illumination in the restaurants must be such as to be inviting from the adjacent sections, although the style of lighting inside should be very different; a lot will depend on the positions of the various departments in relation to one another and also what floor they are on. Because these factors may change, according to the season of the year and the demand for different merchandise, any complete scheme should be sufficiently flexible to cater for all changes. It is not sufficient to allow for this flexibility by simply installing a large number of socket outlets and using temporary additions when required. Such schemes lead to a multiplicity of temporary wiring and unsightly lighting which can spoil even the most carefully designed scheme, and though they may be put in as temporary additions the period of their use is often very extended.

Because of this great number of variables there can be no hard-and-fast rules on the correct method of planning the illumination of a store, and individualism and past experience must play a major role in forming the general background. A lot can be said, however, on the "what not to do's," and from this some basis can be derived.

Any discussion or writing at the present time must take into consideration the existing regulations, restrictions of load and display lighting, and the carrying out of any building work. The term "display lighting," as applied to the interior of a store, is unsatisfactory and is, to a certain extent, hampering modern development. It is hoped that all these regulations will be a memory in the near future. It is, however, because of these regulations that the present tendencies in design are to cater for light from fittings rather than built-in sources, and it is proposed to deal with this aspect in greater detail.

Consideration must first be given to the atmosphere which it is desired to create, and this will, of course, depend on the class of business involved. For this factor, lighting can be divided under two main headings:—

(a) Hard—or direct lighting.

(b) Soft—or dispersed lighting.

To vary the atmosphere one can alter the degree of hardness to suit the class of business—a popular-class business will need the hardest light, while an exclusive salon will need the softest, and there is, of course, a range of intermediate stages, to cover other requirements. A further factor is the colour of the surroundings—a warm and cosy feeling is conducive to individual attention.

The next step is the amount of light required and the general distribution of emphasis. It is very easy to undo all the good points of a scheme by not taking into regard the main traffic directions. In every store there are places

where the customers pause to locate themselves or decide where they wish to go. One such place is immediately inside the entrance; others are outside lifts, and places where one section of a building runs into another. These positions can be called "visual angles" and it is helpful to mark them first on any plan. In deciding the required intensity, the view from these positions should be allowed for. As an example, where several departments or complete sections can be seen at the same time, the farthest should have a slightly higher intensity of visible illumination than the nearest so as to make the general effect appear the same. The exact datum level of illumination will depend on the particular store. It should be the basis for the whole building, and any variations, to give emphasis, etc., should be of a gentle nature; great increases in light in one section always tend to make the surroundings seem dark, and it was very noticeable pre-war that the first additional floodlights (to give some particular merchandise a boost) were always followed by countless more. With the present load allowance of 1½ watts per sq. ft. of floor area, an intensity of illumination in the region of ten to fifteen lumens per sq. ft. is quite reasonable. Such levels are quite sufficient to give good discrimination to the merchandise.

There is always a tendency for intensities to increase over a period of years, and this can, to some extent, be related to the speed at which we live. Everybody seems to be in a hurry, and the speed of vision is a vital factor as to whether or not the details of the merchandise registers at the first glance. Whether this is true or not I do not know, but in the United States, where everybody seems to be in a greater hurry, they have reached much higher levels than over here. The main criterion governing the levels of illumination in the past has been the ability of the lighting engineer to provide such intensities satisfactorily and economically, paying due regard to all the engineering problems involved, and there is no doubt that as our experience grows we shall be able to increase the interior brightness without causing any discomfort to the occupants; there is still

Fig. 1. Plastic fittings in a fashion showroom showing elongated spread of light.

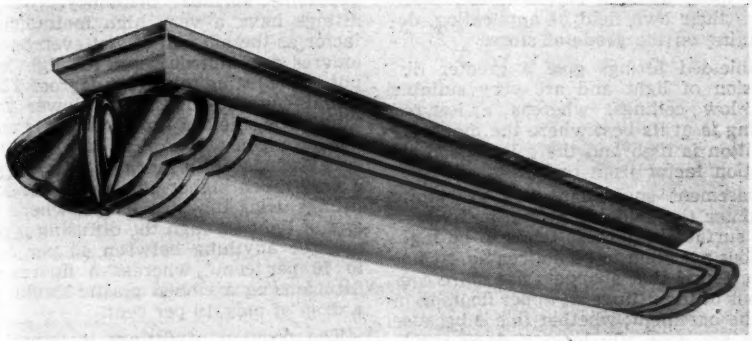


Fig. 2. Plastic shielded fitting for either 2 or 3 lamps, the plastic being very slightly sand-blasted.

a very wide gap between average daylight and the brightest interior. But whatever increase in lighting is installed in the main areas, we must not neglect the odd passage-ways, etc. I once saw an office which had a very high level of illumination, the whole effect being spoilt by the poor intensity in the corridor, necessitating a prolonged pause, whilst the eyes adjusted themselves.

Having decided on the style of lighting required, its intensity and points of emphasis, one can come to the consideration of the actual installation.

Here are two main points that can be borne in mind when selecting the actual fitting. Totally indirect lighting, although the softest form of illumination, provides a cathedral-like atmosphere and the amount of light on the merchandise is insufficient in relation to the watts installed, and unless the ceiling is high can cause considerable glare. Its light maintenance factor is poor, depending, as it does, not only on the cleanliness of the lighting fitting but also on the surfaces of the building. Variation in the colour of wall can materially help this type of installation. Although to have all the light directed on to the ceiling is bad, the reverse is worse, and to concentrate all the light downwards gives that dismal tunnel effect which is causing so much trouble to-day. (Most unsatisfactory fluorescent lighting installations suffer from this complaint.)

It is therefore important that a balance should be struck between these two extremes and a variation between the ratio of light up or down will vary the atmosphere of the surroundings.

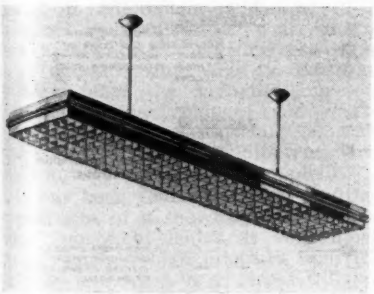


Fig. 3. Louvre suspension fitting of aluminium for either 2, 3 or 4 lamps, all the control gear being incorporated in a channel inside the fitting.

Fluorescent Fittings

All the relighting being carried out at the moment in large stores is principally concerned with the installation of fittings employing fluorescent lamps in some form or other, and although there is still a lot to be learnt about this medium there is no doubt in my mind that they have come to stay.

The fittings being used can be classified under two main types; those employing glass, or plastic shields (or visors)

and those using a louvred base. Each have their own field of application, depending on the grade of store.

Shielded fittings give a greater dispersion of light and are very suitable for low ceilings, whereas a louvred fitting is at its best where the mounting position is high and there is a good reflection factor from the walls.

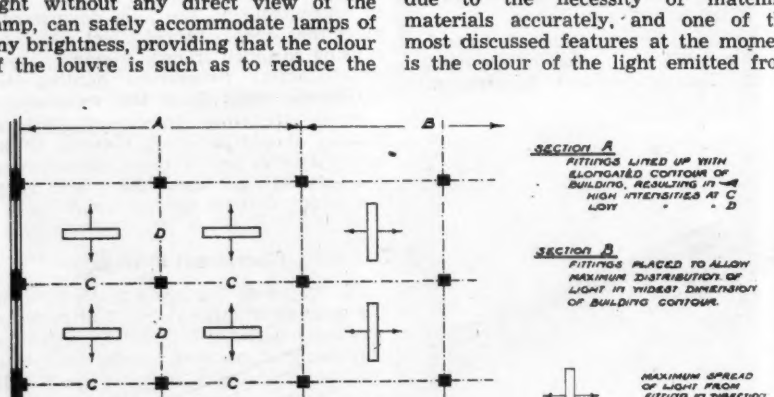
Basement showrooms are a definite field for the shielded fitting, and where the surface brightness tends to be high, it does not seem to be noticeable. It has been found that shoppers are more conscious of the fittings on upper floors than in the basement; whether this is because they are generally looking **down** when descending the stairs and **up** when ascending has yet to be proved, but several instances supporting this theory have been brought to my notice. One great drawback to the average shielded fitting is the accumulation of dust (this is very noticeable with plastic) and suitable methods for both reducing this and ease of cleaning should be provided. Another factor which should be thought of is that as the efficiency of the lamps increases (and it would appear that tubes with an efficiency of 200 lumens per watt may be possible in the future), the brightness of the fitting will be such as to cause considerable glare.

Louvre fittings, giving, as they do, light without any direct view of the lamp, can safely accommodate lamps of any brightness, providing that the colour of the louvre is such as to reduce the apparent surface brilliancy. These fittings have a very high maintenance factor as the amount of dirt even on the louvres does not decrease the light output of the fitting to a great degree. Their initial efficiency is slightly lower than the plastic shielded type, but this is more than compensated for by the maintenance factor. Both types of fittings have a very much higher efficiency over opal fittings using tungsten lamps, where the loss of light through the diffusing media may be anything between 40 per cent. to 70 per cent., whereas a fluorescent fitting using a ribbed plastic shield has a drop of only 10 per cent.

The position of fittings is important and they should be placed at right angles to the maximum spread of light required, which often does not conform to the building structure layout (see Fig. 4). The angle of vision must also be taken into consideration, as there will be less contrast between the surface brightness of the fittings and the ceiling background when looking along the fitting, rather than the side (see Fig. 5). Spacing and mounting height will vary to get the best results.

Colour Harmony

The colour of the light is more important in a store than anywhere else, due to the necessity of matching materials accurately, and one of the most discussed features at the moment is the colour of the light emitted from


A
B
C
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SECTION A
FITTINGS LINED UP WITH ELONGATED CONTOUR OF BUILDING, RESULTING IN HIGH INTENSITIES AT C LOW D
SECTION B
FITTINGS PLACED TO ALLOW MAXIMUM DISTRIBUTION OF LIGHT IN WIDEST DIMENSION OF BUILDING CONTOUR.
MAXIMUM SPREAD OF LIGHT FROM FITTING IN DIRECTION OF ARROWS.

Fig. 4. Showing relationship between axis of fittings and the building contour.

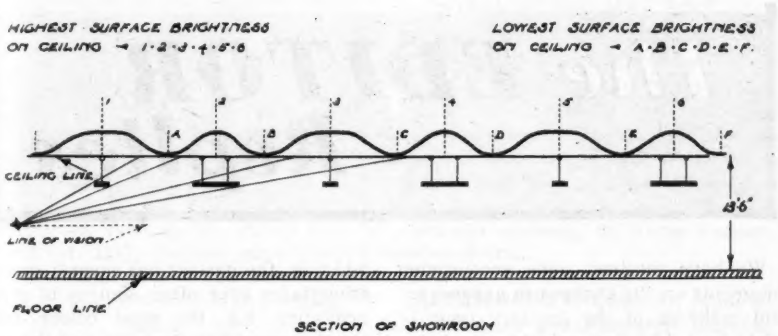


Fig. 5. . Showing how background contrast varies with the position of fluorescent fittings.

these lamps and its effect on merchandise and features. It is important to place this factor in its proper perspective, and to try and bring reason into what might easily amount to chaos. There is no doubt that the early daylight tubes, hastily installed, led to a reputation for bleakness, and the resulting switch over to warm white caused a lot of disappointment, inasmuch as certain colours became distorted. It should be remembered that early use of tungsten lamps brought forth more argument about colour distortion than the introduction of fluorescent, and in those days special daylight matching units were installed on all counters. These lasted until people got accustomed to the colour and now it is accepted as natural. This acceptance was largely due to the yellowness of the light emitted being *kind* to features, whereas when the daylight lamp was introduced the coldness did make people look dismal, especially as they had expected something different, having confused daylight with sunlight.

It has been found that the resulting appearance of a showroom, using daylight fluorescent lamps, is very much better under a high intensity than the reverse, and some large stores will not have any other colour.

Mixing of different colour tubes can be done to a limited degree, and the most successful is two daylight tubes and one warm white in a three lamp fitting; with this the colours seem to mix thoroughly in the fitting, whilst a two-lamp fitting using one of each looks exceedingly poor, with a definite part of the fitting a different colour.

What is called colour distortion of the human features is very often harshness of the shadows. Because of its increased efficiency, the amount of light directly over a person is greater with fluorescent lamps than with tungsten, with the result that the shadows under the eyes, nose, etc., are darker; it is essential that the colour of the walls and carpets be as light as possible to soften this effect, and that the light is spread as much as possible.

Future commercialisation of different coloured tubes will help to correct the distortion of merchandise, and with these and correctly designed fittings the present controversy should die an early death.

If the foregoing seems to stress the use of fluorescent lamps, it is only because they are the greatest potential in present-day store lighting, and it can be stated that although their overall running costs (taking all factors into consideration) may under certain circumstances be dearer, there are decided savings in load and electricity consumption and this feature is an asset to the national economy.

The next article of this series will deal with the design of fittings, and what we want in store lighting of the future when all restrictions are removed.

The EDITOR Replies

We have received some encouraging comments on the *changes in appearance* and make-up of the January issue of *Light and Lighting*, which are being maintained in our present number. The cover is now printed in two colours, the advertising matter being in black, and new headpieces have been introduced inside, in place of others which served well for a time but had become rather old-fashioned.

We are also trying to meet one criticism occasionally heard, and doubtless justified—that the journal should contain *more meat*. "More meat" in general demands more space. To a small extent this can be found by economy and rearrangement, but in the main it involves a need most difficult to satisfy at the present time—more paper. This, however, will doubtless be remedied in time to come.

I have received several inquiries on the subject of *the "gas-arc,"* the new source of light recently reported by Dr. J. N. Aldington at an I.E.S. meeting in Liverpool (*Light and Lighting*, November, 1947, p. 193). In particular, I have been asked for some closer indication of *the efficiency attainable*. It will be recalled that the lecturer himself was not very explicit on this point, no doubt preferring to await developments, which are still proceeding. I understand, however, that the efficiency ultimately reached is likely to compare quite favourably with that of other sources. In addition, the gas-arc has several special advantages over other sources of great brilliancy, e.g., the good colour, very closely resembling daylight, and the fact that the full brightness is attained practically instantaneously after switching on. I understand that a fuller account of this most interesting source of light is to be given by Dr. Aldington to the I.E.S. in London next session. Members will look forward to this with keen interest.

It has been pointed out that in referring to *Mr. J. M. Waldram's address* to the American I.E.S. in our last issue (p. 3) I rather overlooked something that was very relevant, the editorial comment in *Illuminating Engineering* on the previous page. This spoke of Mr. Waldram's address as "a highlight" at the Conference, and fully endorsed the need of science to *understand people*, as well as things—a duty which the I.E.S. in this country and America have both good reason to appreciate.

A correspondent interested in Calor Gas recently asked for information in regard to the *lighting* by this means *of a sea-marker*, which was required to be "visible from a distance of three-quarters of a mile." What candle-power could be safely adopted in such a case? This, unfortunately, is by no means easy to state off-hand In clear weather, obviously, even a source of quite low candle-power might be visible at much greater distances—as householders in

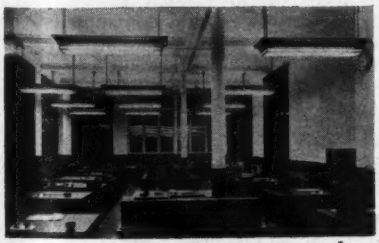
the early stages of the black-out were made well aware.

What happens in more or less misty weather is, however, much more difficult to declare and, indeed, is scarcely possible to foretell without reference to standard tables of *atmospheric visibility*. Possibly some of the British Standard Specifications, such as No. 942 of 1941 and 563 of 1947, dealing respectively with searchlight beams and aerodrome lighting, might be helpful in this respect.

Incidentally, it would be interesting to learn something more of calor gas and its application in remote situations. This is rather out of the ordinary run of the illuminating engineer, who may nevertheless be consulted occasionally in regard to the lighting of objects in places where neither mains gas nor electricity is available.

Modern Office Lighting

The new and spacious Manchester offices of the London Assurance Company have recently been re-lighted. The heavy ceiling and mahogany panelling



made lay-lighting unsuitable, and special decorative pendant fittings incorporating three 5-ft. MetroVick fluorescent tubular lamps were accordingly designed. The picture shows the appearance of the installation where 12 lumens per square foot, with a total loading of 4.76 kw., is provided.

SITUATIONS VACANT

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Early Lighthouses

In 1939, in the 500-year-old lantern tower of St. Nicholas Cathedral, Newcastle-on-Tyne, there burnt from dusk until dawn a 2,000-watt electric lamp. The City Fathers agreed to be responsible for its upkeep, and it reminded one of the time when a lantern was always shining in this tower to serve as a landmark and guide to mariners making port.

Before the days of modern lighthouses church towers were often put to such use. This custom probably seems strange, but at one time church towers and steeples were more widely used for such purposes than at the present time. They appear to have been employed not only for lighting the way of the mariner at sea but also the path of the traveller on land, for in the middle ages Britain was far more thickly forested than now, and the roads were both incredibly rough and frequently infested by criminals.

King Alfred is believed to have done much to encourage the use of warning lights, but the less provident kings who followed him failed to carry on his work. No notable advance was made until the twelfth century, when a society of "Godly disposed men" was founded by Stephen Langton, Archbishop of Canterbury, to check the systematic wrecking and pillage of ships on the English coast, to succour the shipwrecked, and to provide and light proper seamarks and beacons for the guidance of mariners.

This historic body was the origin of Trinity House, which still has the control of the lighthouses, lightships, buoys, etc., round Britain's coasts. It was granted its first charter of incorporation by Henry VIII in 1514, and its old full title was "The Guild, Fraternity, or Brotherhood of the Most Glorious and Undivided Trinity, and of St. Clement in the Parish of Deptford Strond," otherwise Deptford Strand, or foreshore.

In addition, many chantries and monkish institutions maintained lighthouses around the shores of the British Islands, and they are frequently mentioned in ancient chronicles.

Warning lights shown from church towers were not very powerful. Occasionally they were fires in cressets, kinds of metal baskets; at other times they were simply candles with painted boards to serve as reflectors, the range of the light being about one mile. In the seventeenth century some lights had only two candles, though Smeaton's famous Eddystone lighthouse had 24. The candles were protected by glass, and it was not until oil lamps were introduced that much progress was made in devising means of concentrating the light.

The Bishop's Rock lighthouse.

By way of contrast, the picture on this page shows the famous Bishop's Rock lighthouse, which was equipped by Messrs. Chance Bros., and which has a maximum candle-power of 622,000, being visible for 18 miles.

Personal

Mr. Cecil Hughes has been elected President of the Electrical Trades Commercial Travellers Association. Mr Hughes, who is a Fellow of the Illuminating Engineering Society, has been connected with the commercial side of the Electrical Industry for 40 years and is Sales Manager of Siemens Electric Lamps and Supplies, Ltd. He is a past chairman of the Electric Lamp Manufacturers Association and a member of the Council of the Electric Light Fittings Association.